U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1750

Attrition in the Army from the Signing of the Enlistment Contract through 180 Days of Service

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This work addressed attrition from the Army's Delayed Entry Program (DEP) and the training phase of enlistment. The sample was the file of all non-prior service Active Army contracts executed in fiscal years 1992 and 1993, tracked in service through fiscal year 1995. Independent variables were all information the Army routinely collects with the signing of enlistment contracts; the dependent variable was the dichotomous attritted or still serving. The total N of 159,649 was divided into two halves. The first half was used to identify independent variables that discriminated the criterion groups, the second half to determine what the effect would be if those variables were used for pre-enlistment screening. Results indicated that AFQT Category IIIB individuals had attrition rates indistinguishable from IIIA scorers; that non-high school diploma graduates continued to be poor attrition risks, except for those who had participated in military youth programs; and that extremely heavy individuals were poor risks. The information was applied to screen holdout group files and construct plots cross tabulating cases which would have qualified or not, by attritted or still serving.

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Research Report 1750

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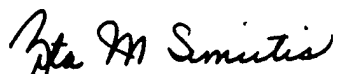
FOREWORD

Attrition in the Army is the equivalent of turnover in private industry. Although some of it is unavoidable in either type of organization its occurrence is nevertheless disruptive of smooth functioning, and managements continually seek to reduce those aspects of attrition that are within their control.

The work reported here examined every item of information the Army regularly elicits from applicants, in order to derive an "Attrition Profile"; that is, a set of identifiable factors seeming to predispose certain applicants to attrition. An Attrition Profile would be of great personnel management value in permitting the Army to enlist only those individuals who showed the greatest promise for completing their enlistment tour.

Outcomes of this work have been shared with the Army Recruiting Command and with the Office of the Department of the Army's Deputy Chief of Staff for Personnel.



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ATTRITION IN THE ARMY FROM THE SIGNING OF THE ENLISTMENT CONTRACT THROUGH 180 DAYS OF SERVICE

EXECUTIVE SUMMARY

Research Requirement:

Attrition occurs when a soldier does not complete the term of his or her enlistment contract. It may occur for a variety of reasons such as illness or injury, pregnancy, excessive weight gain, making an unsatisfactory adaptation to the military environment. It may occur prior to the individual's coming onto active duty, when a member of the Army's Delayed Entry Program (DEP); while in training, nominally the first 180 days of active duty; or post-training, after the 180th day but before the end of the contracted term. Since the late 1980's DEP and 180-day attrition increased from approximately 10% a year to 16%, while post-training attrition was level at approximately 20% a year.

In response to a request from the Army's Deputy Chief of Staff for Personnel that DEP attrition be studied, this work addressed it as well as training attrition in view of the similarity in their growth rates. The intention was to determine if there might have been common causes or correlates of these two aspects of early attrition.

Procedure:

Files of all non-prior service Active Army contracts executed in Fiscal Years 1992 and 1993 were reviewed for DEP completion or not, and completions were tracked through Fiscal Year 1995 for determination of 180-day completion or not.

The total sample of 159,649 files was divided into two random halves. Files of the first half sample were searched on all information the Army routinely obtains at the time enlistment contracts are signed, to detect information that differentiated "attritters" from "completers." Files of the second half sample were used to determine what the effect would be if the differentiating information were used as a pre-enlistment screen.

Findings:

Individuals who had scored in AFQT Category IIIB had attrition rates indistinguishable from those in Category IIIA. Non-high school diploma graduates had high attrition rates, consistent with the findings of all prior research. Exceptions to high attrition rates of non-high school diploma graduates in general, were two specific classes: males who had acquired 15 semester hours of college credits, and males and females who had participated in military youth programs like Junior ROTC. Finally, the heaviest five percent of both males and females had high attrition rates.

The above information was assembled into two screens, the most stringent requiring High School Diploma, AFQT Category I-IIIB, and Weight Below 211 Pounds (males) or 165 Pounds (females). The somewhat more lenient screen consisted of all of the elements of the previous screen but permitted non-high school diploma graduates who had participated in Military Youth Programs or who had acquired 15 Semester Hours of College Credits (males only).

When the screens were applied to the holdout sample the change in DEP attrition was slightly less than one percentage point and the change in 180-day attrition was approximately one and one-half points. The manpower costs to accomplish these attrition changes were 12,000-13,000 fewer applicants qualifying; and approximately two-thirds of the soldiers who would have been rejected had in fact served through 180 days.

Utilization of Findings:

From an attrition point of view, AFQT Category IIIB scorers can be contracted with no greater limitation or restriction than Category IIIA scorers. The recruiting market can be further expanded to include male non-high school diploma graduate applicants who have acquired college credits, and either gender non-high school diploma graduate applicants who had participated in military youth programs. Finally, pre-enlistment screening can be disqualified as a means for reducing attrition in a period of difficult recruiting.

ATTRITION IN THE ARMY FROM THE SIGNING OF THE ENLISTMENT CONTRACT THROUGH 180 DAYS OF SERVICE

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Introduction

Attrition takes place when a soldier is discharged prior to completion of the term of his or her enlistment contract. This occurs for various reasons. Some soldiers become ill or injured during military training, some become unacceptably overweight, some make a poor adjustment to the highly structured military environment. When attrition occurs, it is a loss situation to just about all involved: the training seat or organizational position reserved for the individual goes unfilled, at an obvious cost; Recruiting Command must replace the individual, in effect recruiting two people to fill one space; and there is probably a sense of sadness and failure on the part of the soldier involved.

Attrition was well studied in the early days of the volunteer force (Fischl, 1977; Martin, 1977; Sinaiko, 1977; Wiskoff, 1977), up through the 1980's (Buddin, 1984, 1988). Gradually, beginning about 1990, the rate of attrition during the first six months of service began growing. This growth of several percentage points a year prompted the Department of the Army's Deputy Chief of Staff for Personnel in February 1995 to assemble representatives of major Army staff agencies, training and personnel management agencies, personnel research and development agencies, and the joint service personnel testing agency, at an "Attrition Roundtable," the purpose of which was to examine causes and potential remedies for the growth in attrition.

In April of 1995 the Army's Deputy Chief of Staff for Personnel requested the Army Research Institute and the Army Recruiting Command to perform a collaborative investigation of Delayed Entry Program attrition. The Delayed Entry Program (DEP) is a program in which an applicant signs an enlistment contract with provision to enter onto active duty at some future time. In fact, because obtaining information about any prior criminal activity an applicant may have entails time for the performance of a National Agency Check (convicted felons are not eligible for military service), no one enters onto active duty immediately. An individual may be a member of the DEP for up to 365 days, but most spend no more than 3-4 months before "shipping." Information that surfaced at the Attrition Roundtable was that attrition from the DEP, in which the individual is technically in the Individual Ready Reserve (IRR), had grown at rates almost exactly paralleling the rates of attrition during the early period of active duty.

A plan was developed to investigate whether the same variables might have been causes or correlates of both aspects of this early attrition, making attractive the prospect of developing an "Attrition Profile" for screening out high risk applicants, or for alerting recruiters to pay special attention to certain people while they were in the DEP so as to help them through.

The intention was that this investigation be a definitive examination of contemporary attrition from the Army, focusing on the early enlistment period. To that end it analyzed the data of every enlistment contract signed in the preceding two years, and it tracked the records of all enlistees through 180 days of service. This process enabled determination of what variables discriminated attrition from completion, and what the consequences would be if they were employed as a pre-enlistment screen.

Method

Sample

The sample consisted of all non-prior service Active Army contracts written in Fiscal Years 1992 and 1993.[1] The total N was 159,649, of which 81.4% were male, 18.6% were female, 20.9% were Black, and 74.0% were White. Records of these individuals were tracked using in-service cohort files through Fiscal Year 1995.

Independent Variables

The obtained data files consisted of all information routinely collected in connection with enlistment contracting. This is in excess of 150 variables. Of that set, many variables were eliminated as irrelevant for purposes of this work. Examples of these irrelevant variables are religious affiliation, drivers license number, blood pressure, and recruiter identification.

The remaining independent variables, which were considered in this study, are listed in Table 1. The definitions of most of these variables are self-evident; but a few clarifications are provided below and more complete formating information is described in a later section.

Age, Marital Status, and number of Dependents were as of the date that the enlistment contract was signed.

Contract Renegotiation refers to whether an enlistee negotiated with the Army to change the date of reporting for active duty.

Education is the highest level of civilian education completed as of the contract date.

The Geographic Region variable is a designation of the U.S. Army Area from which the applicant enlisted.

Military Youth Programs are best described by example. They include ROTC, Junior ROTC, and similar military sponsored programs.

ASVAB is the selection and job classification test battery that all military service applicants take. For Army purposes, subtests of this battery are combined into ten composites called Aptitude Area Scores.

Auditory Perception is a separate test that had previously been administered to Army applicants for jobs requiring the learning of code.

Language Aptitude Test is more fully the Defense Language Aptitude Battery and is a separate test battery administered to applicants for jobs requiring the learning of a foreign language.

Motor Vehicle Driver Battery is a separate test battery that had previously been administered to Army applicants for jobs requiring the driving of motor vehicles.

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[1] The contract files provided by the U. S. Army Recruiting Command follow enlistees (N=160,372) from contract signing to either accession onto active duty or loss from the DEP. Information on attrition from active duty was obtained by matching contract files to in-service cohort files, using Social Security Numbers (SSN). Due to discrepancies between the two databases, the dispositions of 723 contracts could not be confirmed and these contracts (0.4%) were excluded from all analyses.

Table 1

Independent Variables

Variable Name
AFQT
Age
ASVAB Aptitude Area Scores
Auditory Perception Test Score
Citizenship Status
Contract Renegotiation
Dependents
Education
Enlistment Bonus
Enlistment Waiver
Gender
Geographic Region
Language Aptitude Test Score
Marital Status
Military Occupational Specialty
Military Youth Program
Motor Vehicle Driver Battery Test Score
Race
Term of Enlistment
Weight

Dependent Variables

Two outcomes were of interest in this study: whether the enlistee completed or attritted from the DEP; and, of those who came onto active duty, whether the enlistee was still serving 180 days later or had attritted from active duty. A third dependent variable, "Overall Loss," was created by combining DEP-losses and 180-Day losses in order to examine the combined incidence of early attrition.

Measures

This section describes all variables which needed to be created or re-formated for the data analyses.

AFQT. AFQT scores were collapsed into the standard grouping of Test Score Categories as follows: 93-99=Category I, 65-92=Category II, 50-64=Category IIIA, 31-49=Category IIIB, 10-30=Category IV.

Age. Age on contract date was divided into three categories: 17 years or less, 18-26 years, and 27 years or older.

Dependents. Number of dependents was collapsed into three categories: No dependents, One dependent, and Two or more dependents.

Education. The education variable contained 20 levels. These levels were recoded to reflect three categories: High School Diploma Graduate or higher (HSDG), Non-High School Diploma Graduate (NHSDG), and High School Senior (Senior)[2]. In addition, for certain purposes the NHSDG category was dissected to permit analysis of the most frequently occurring alternative educational credentials. These were "15 Semester Hours of College Credits," "General Equivalency Diploma (GED)," and "Adult Education Diploma."

Enlistment Bonus. Due to the relatively small number of enlistees receiving bonuses (4.4%), this variable was coded dichotomously as either having received a bonus of any amount or not.

Geographic Region. The database recorded the state from which the applicant enlisted. States were recoded to reflect the U.S. Army Area in which they are located. Foreign countries and U.S. territories were coded as "Other".

Marital Status. The following categories were specified in the original data set: Married, Divorced, Annulled, Interlocutory, Legally Separated, Widowed, and Single. For the analyses, the only distinction that was made was between Married and "All Others".

Military Occupational Specialty. Due to the large number of different specialties, MOS were classified according to their functions in the Army: Combat, Combat Support, and Combat Service Support.

Military Youth Program. Relatively few enlistees (2.8%) had been enrolled in a youth program. This variable, therefore, was dichotomized as yes/no to distinguish those who had participated from those who had not.

Race. The database contained the following categories: White, Black, Asian, American Indian, and Other. The last three groups were not large enough individually to conduct analyses on so they were combined and labeled "Others".

[2] The reason behind the need to create a "Senior" category is described in the Analysis section.

DEP-Loss. The information for determining DEP-loss was drawn from the contract file which listed enlistees as "Accession," "DEP Loss," or "Open Record." For Open Records (n=24,624), enlistees were re-coded as accessions if their Social Security Numbers could be matched with those in the Fiscal Years 1992-95 in-service cohort files (n=20,351). Those who were not identified as having come onto active duty were re-coded as DEP losses (n=4,273).

180-Day Loss. Each soldier's date of entry onto active duty was subtracted from his or her separation date in order to determine the number of days of service which were completed. For those who did not complete 180 days of service, a small amount of recoding (1.6%) was necessary depending on the reason for the soldier's separation. For example, soldiers who were separated in order to attend an officer training program were coded as still serving.[3]

Analysis

The first step in our analysis was to divide the sample in order to create two groups: a primary analysis group and a holdout group.[4] All analyses were first conducted on the primary group. The holdout group was subsequently used to verify any inferences drawn from the primary group results.

A preliminary look at the primary group revealed a problem with the education variable. Three categories, "Currently in High School," "High School Senior," and "High School Senior Expected to Graduate," contained 7,786 enlistees of whom 3,043 completed the DEP and entered onto active duty. The Army does not bring high school seniors onto active duty; obviously the records had not been updated to reflect whether these individuals had received their high school diploma or not. We analyzed the primary group to determine if there was any unique attrition behavior of the "Seniors," and recoded the Seniors in the holdout group to graduate and non-graduate categories at the rates found in the total sample (91.3% and 8.7%). We also performed certain holdout group analyses excluding the Seniors completely.

The analyses of the primary group followed the general form of calculating the attrition rate for each coded category of each independent variable in order to determine which variables discriminated attrition from completion. The most discriminating variables were then applied to the holdout group in order to determine what the effect would be if these variables were used for pre-enlistment screening of Army applicants.

Results

Results are of three kinds. Initially we present summary statistics of the total sample, primary analysis group, and holdout group. Then we present results of examination of independent variables of interest and determination of those which discriminated the dichotomous criterion, complete versus attrit. Last we present what the outcomes would have

[3] The system used to classify separation codes was the same one that is employed by the Department of the Army Headquarters Staff. A complete description of this system can be obtained from the authors upon request.

[4] SPSS for Windows 7.0 (1995) was used to randomly split the database in half and produce the primary analysis group (n=79,842) and the holdout analysis group (n=79,807). This statistical package was used for all subsequent analyses.

been if the most discriminating variables had been applied to the holdout group as a pre-enlistment screen.

Summary Statistics

Table 2 provides a statistical summary of the total sample, Tables 3 and 4 provide the same information for each half sample.

Variables of Interest

Table 5 presents results of analyses performed on certain variables because of their historical, sociological, or policy interest.

AFQT Score Category. The first, and perhaps most important of these for military selection purposes, is the AFQT score category. The Army has historically been most interested in applicants scoring in Mental Categories I through IIIA; that is, in the top half of the score distribution. Table 5 confirms the desirability of individuals scoring in Categories I through IIIA and the undesirability of those scoring in the Category IV range. It also shows that 180-Day attrition of scorers in Mental Category IIIB is within rounding error of those in IIIA, and their DEP attrition is several percentage points lower.

AFQT IIIB Scores. Table 6 extends the examination of attrition rates among Category IIIB scorers, to seek a break point; that is, to determine if the favorable attrition performance was limited to scorers in the top portion of the Category. As Table 6 shows, the distribution of attrition rates is almost completely flat from the top of the Category to the bottom, with no obvious break points. This information has important recruiting implications. It means that, with regard to attrition, there is no reason to limit the number of Mental Category IIIB individuals; it is therefore potentially a recruiting market expander.

Enlistment Waivers. Occasionally an otherwise qualified applicant may require the waiver of some standard in order to enlist. Seven percent of the enlistment contracts indicated that a waiver had been granted. As Table 5 shows, the Army's waiver policy is working well. Soldiers granted waivers attritted from the DEP at about one-fourth the rate of soldiers not requiring waivers, and the 180-Day attrition rates of the two groups were within rounding of one another.

Contract Renegotiation. Seven percent of the enlistment contracts had been renegotiated to a different, usually later, active duty reporting date. Table 5 shows that roughly a fourth of these attritted from the DEP. As excessive as this DEP attrition rate appears compared to all others in the table, it is actually a positive sign that Army Recruiting Command is managing the DEP much better than in previous years. ARI research in the 1980's found that the DEP loss rate of those who renegotiated their active duty reporting date to a later month was 74% (Celeste, 1986). Thus the change from 74% to 25% is very notable.

Table 2

Total Sample Summary Statistics

Sample Characteristic	Frequency	Percent
Contracts Signed	159,649	100.0
DEP Attrition	21,200	13.3
Random Losses[a]	500	<1
Accessions to Active Duty	137,949	86.4
180-Day Attrition	19,037	13.8
Still Serving at 180 Days	118,912	74.5

[a] Examples of random losses are death, injury, pregnancy.

Table 3

Primary Analysis Sample Summary Statistics

Sample Characteristic	Frequency	Percent
Contracts Signed	79,842	100.0
DEP Attrition	10,750	13.5
Random Losses[a]	258	<1
Accessions to Active Duty	68,834	86.2
180-Day Attrition	9,474	13.8
Still Serving at 180 Days	59,360	74.3

[a] Examples of random losses are death, injury, pregnancy.

Table 4

Holdout Sample Summary Statistics

Sample Characteristic	Frequency	Percent
Contracts Signed	79,807	100.0
DEP Attrition	10,450	13.1
Random Losses[a]	242	<1
Accessions to Active Duty	69,115	86.6
180-Day Attrition	9,563	13.8
Still Serving at 180 Days	59,552	74.6

[a] Examples of random losses are death, injury, pregnancy.

Table 5

Attrition Rates Among Variables of Interest

Variable	Attrition Rate (%) DEP	180-Day
AFQT Category		
I	12.9	8.9
II	14.1	12.4
IIIA	14.8	14.5
IIIB	11.1	15.4
IVA	9.1	20.4
Waiver Policy		
Waiver Granted	3.7	14.3
Waiver Not Required	14.2	13.7
Contract Renegotiated		
Yes	24.8	15.1
No	12.6	13.7
Gender		
Male	12.2	12.8
Female [a]	18.9	18.1
Race		
White	13.9	15.0
Black	12.2	10.4
Others	12.3	10.4
Age		
17 and Younger	22.0	13.1
18-26	12.8	13.8
27 and Older	14.6	13.7
Marital Status		
Married	9.1	15.3
Others	14.1	13.5
Dependents		
None	13.5	13.8
One	7.9	14.2
Two or more	9.8	15.4
Enlistment Term (Years)		
2	16.6	12.8
3	11.8	13.3
4	13.8	14.8
5	14.7	16.2
6	15.5	10.7
U.S. Army Area		
First Army	12.9	14.4
Third Army	13.2	13.7
Fifth Army	12.8	13.8
MOS Category		
Combat	12.6	15.1
Combat Support	13.9	14.6
Combat Service Support	13.9	12.6

[a] See text for important exception to female attrition rates.

Table 6

Attrition Rates by AFQT Score for Individuals in Test Score Category IIIB

Score[a]	Attrition Rate (%)	
	DEP	180-Day
49	13.5	15.1
48	13.0	16.6
47	13.4	14.9
46	11.2	15.3
45	10.0	15.7
44	12.2	15.0
43	12.0	15.0
42	10.7	15.2
41	10.5	16.4
40	12.6	15.5
39	10.8	14.4
38	11.1	15.2
37	9.7	15.9
36	11.3	14.0
35	11.5	15.3
34	11.2	16.0
33	10.3	13.8
32	9.2	16.2
31	10.0	16.4

[a] AFQT scores are percentile ranks in a specified reference population.

Gender. Table 5 shows that women had extremely high attrition rates, both from the DEP and from active duty. The footnote to the table calls attention to a very important exception to these overall female attrition rates: the Black female rate of 180-Day attrition was found to be 12.2%, significantly **lower** than the **overall male** rate shown in the table, and lower than the White male rate of 13.8% (not shown in the table); the Black female rate of DEP attrition was 14.8%, again markedly lower than the overall female rate.

Race. Related to the above observation, Table 5 shows that Black and other minority member soldiers attritted at a much lower rate than did White soldiers. For perspective, the group labeled "Others" comprised less than five percent of the sample.

Age. Table 5 shows negligible age variation in 180-Day attrition; the only conspicuous age-related event being DEP attrition among the 17-year olds (seven percent of the sample).

Marital Status and Dependents. Married applicants (12% of the sample) and applicants with dependents (13% of the sample) both had lower DEP attrition rates than others, but performed similarly at 180 days.

Term of Enlistment. Three-fourths of the sample consisted of soldiers with three and four-year enlistment terms. No other group exceeded ten percent of the sample. These data do not support any generalization that either long enlistment terms or short enlistment terms are better for the Army from an attrition point of view.

U.S. Army Area. As may be seen, the distribution of loss rates from the DEP and at 180 days was within rounding, irrespective of Army Area.

MOS Category. Combat Service Support was the largest category, comprising approximately half of the sample. These soldiers' 180-Day attrition rate was noticeably lower than the other groups', as was the Combat Arms soldiers' (approximately 30% of the sample) DEP attrition rate.

Discriminating Variables

Table 7 presents the independent variables that maximized the disciminability of the criterion groups.

Probably the most durable attrition finding (Buddin, 1984; Cheatham, 1978; McBride, 1993; White, Nord, Mael and Young, 1993; Zook, 1996) was again replicated here; specifically, the Non-High School Diploma Graduates attritted at about half-again the rate of High School Diploma Graduates. The problem with the coding of the "High School Seniors" was described earlier; and Table 7 shows that the DEP attrition of this group was grossly excessive.

Weight may be seen as not of major attrition consequence during the period of the DEP; however, the heaviest five percent of male and female soldiers attritted from active duty at half-again the rate of all the other soldiers.

Table 7

Attrition Rates Among Discriminating Variables

Variable	Attrition Rate (%) DEP	180-Day	Overall
Education			
High School Diploma Graduate	8.0	13.2	20.0
Non-High School Diploma Graduate	12.2	19.7	29.3
High School Senior	60.9	14.2	64.8
Weight			
Heavy Male [a]	12.5	18.2	28.3
All Other Male	11.6	12.7	22.8
Heavy Female [b]	15.0	27.0	37.7
All Other Female	18.3	17.8	32.7
Participant in Military Youth Program			
Yes	0.3	11.1	11.4
No	13.8	13.9	25.7

[a] This category consists of the heaviest 5% of males in the sample, weighing 211 pounds and heavier.

[b] This category consists of the heaviest 5% of females in the sample, weighing 165 pounds and heavier.

Finally, although fewer than three percent of the sample had been participants in military sponsored youth programs, their DEP attrition rate was the lowest of any group studied and their 180-Day attrition rate was among the lowest.

We thus see that the highest attrition-risk groups over which the Army might exert policy control[5]are Non-High School Diploma Graduates and extremely heavy individuals. In the next section we present what the consequences would have been if these and certain other variables had been applied to the holdout group as a pre-enlistment screen.

Screening the Holdout Group

Two pre-enlistment screens were assembled, based on the results obtained with the primary analysis group described above. The first was called "Maximum Screen," and it consisted of **High School Diploma Graduates** only, scoring in **AFQT Categories I-IIIB**, and **weighing less than 211 pounds** (males) or **less than 165 pounds** (females).

In recognition that limiting enlistments to high school diploma graduates, even if increasing the numbers of Mental Category IIIB scorers, would still cut fairly deeply into the pool of eligible individuals, an alternative screen was developed and named "Maximum Screen Augmented." It consisted of the above variables plus certain non-high school diploma graduates. The most successful non-high school diploma graduates were male soldiers who had acquired 15 Semester Hours of College Credits, presumably as nonmatriculated students or in open enrollment programs. Table 8 shows attrition rates of male and female non-high school diploma graduates in the three highest frequency alternative credential groups (these three groups accounted for 90% of the NHSDG sample).

"Maximum Screen Augmented", then, added **Male NHSDG with 15 Semester Hours of College Credits**, and those NHSDG, both male and female, who had participated in **Military Youth Programs**. Not that this screen would exclude female NSHDGs with 15 semester hours of college credits but not those who had participated in military youth programs.

Table 9 presents the results of these two screens. Table 9 should be compared with Table 4 in order to see the impact of the screening. The most noticeable difference between the two tables is that the screens would have resulted in 12,000-13,000 fewer contracts being signed, the Maximum Screen yielding a difference of some 13,000, the Maximum Screen Augmented yielding a difference of just under 12,000. This is what a screen is supposed to do, admit fewer people. Later in this section will be presented the extent to which the screening would have affected the correct individuals.

Less striking results are the changes in the rates of DEP Attrition, less than a percentage point for either screen; 180-Day Attrition, from 13.8% to 13 or 13.1%; and the roughly 1-1/2 point gain in the percentage of contracts resulting in soldiers Still Serving at 180 Days. It

[5] Renegotiation requests will continue to occur, and renegotiation probably should continue to be permitted, particularly since renegotiators who accessioned onto active duty did not have excessive rates of 180-Day attrition; screening on gender and race is against the law.

Table 8

Non-High School Diploma Graduate Attrition Rates by Category of Alternative Credential

Credential	DEP Attrition			180-Day Attrition		
	Male	Female	All	Male	Female	All
15 Semester Hours (n=2,329)	7.3	10.7	8.0	16.6	25.7	18.4
Adult Education Diploma (n=1,116)	6.1	9.1	6.5	18.3	28.1	19.1
General Equivalency Diploma (n=2,183)	11.0	24.0	12.4	20.5	30.2	21.4

Table 9

Holdout Sample Summary After Screening

Sample Characteristic	Maximum Screen		Maximum Screen Augmented	
	Frequency	Percent	Frequency	Percent
Contracts Signed	66,187	100.0	68,261	100.0
DEP Attrition	8,104	12.2	8,243	12.8
Random Losses	207	<1	212	<1
Accessions to Active Duty	58,083	87.8	60,018	87.9
180-Day Attrition	7,558	13.0	7,867	13.1
Still Serving at 180 Days	50,318	76.0	51,939	76.1

appears that neither screen would have helped very much.

A small benefit may be seen from a slightly different perspective. Since the holdout sample consisted of 59,552 soldiers completing 180 days of service (out of 79,807 contracts signed), how many contracts would have been required to produce 59,552 under the two screens? The Maximum Screen, with 76% of its accessions still serving at 180 days, would have required 78,358 contracts; the Maximum Screen Augmented, with 76.1% of its accessions still serving, would have required 78,255 contracts. That is, the Maximum Screen would have required 1,449 fewer contracts to produce the same results at 180 days, the Maximum Screen Augmented would have required 1,552 fewer.

The final set of results reports whether the screens would have selected/rejected the correct individuals. It will be recalled that the screens would have admitted 12,000-13,000 fewer soldiers. The question was whether those who were screened out would have attritted; if so, the screens could be considered effective.

Table 10 presents a **cross tabulation** of cases which would have qualified or not under the Maximum Screen, by our **known outcome** of whether they had completed the DEP and were still serving at 180 days, or had attritted at one or the other stage. The top left and lower right cells thus show what would have been correct screening decisions, accepting those still serving and rejecting those who attritted; the remaining two cells show what would have been errors, selecting attrittees and rejecting soldiers still serving. There seem to be **two key messages** displayed in Table 10. The percentage of individuals Selected who would have been **Still Serving** at 180 Days is **only 1.4 percentage points higher** than the rate in the unscreened sample (74.6%, Table 4), and attained at a **high cost of erroneous rejection**--we note that two-thirds of the individuals who would have been rejected, in fact were still serving at 180 days.

Table 11 presents the same cross tabulation, showing the consequences of using the Maximum Screen Augmented. There is very little different from Table 10; the gain in correct selection is a tenth of a point higher; the combined cost of the two types of errors is two points less; but, under this screen also, about two-thirds (65.9%) of the individuals who would have been rejected turned out to have been still serving at 180 days.

Discussion

This examination of early attrition analyzed a 100% sample of enlistment records for the fiscal years chosen, and evaluated all information the Army routinely collects in connection with the signing of enlistment contracts. A slight problem with data files on "High School Seniors" was compensated for with an adjustment. Given this information, what statements may be made concerning attrition in the early enlistment period?

1. AFQT Mental Category IIIB individuals are good attrition risks; i.e., have no higher attrition rates than Mental Category IIIA individuals.
2. Non-High School Diploma Graduates in general are very bad attrition risks.

Table 10

Percentage of Individuals Selected and Rejected Under Maximum Screen

Status at 180 Days	Selected	Rejected
Still Serving	76.0	67.8
Attritted	24.0	32.2
Total	100.0	100.0

Table 11

Percentage of Individuals Selected and Rejected Under Maximum Screen Augmented

Status at 180 Days	Selected	Rejected
Still Serving	76.1	65.9
Attritted	23.9	34.1
Total	100.0	100.0

3. The NHSDG risk is reduced among applicants who have acquired college credits, particularly in the case of male applicants, and among those who have participated in military sponsored youth programs like Junior ROTC. To the extent feasible, recruiting activities could seek individuals with these backgrounds as ways of expanding the recruiting market.
4. Extremely heavy individuals are bad attrition risks.

This information was employed to develop maximally discriminating, legal, screens. When the screens were applied the gains were very small and the costs were great in terms of erroneous rejection of successful soldiers.[6]

It may be that 13% attrition per enlistment phase (Tables 2, 3, 4, 9) is an unavoidable "cost of doing business" in the post-cold war Army that has multiple equal opportunity objectives. It may also be that enhanced leadership and stricter command emphasis on tour completion will reduce the rate.

Although there is always the possibility that some additional screening information might produce attrition, what is very clear from this investigation, though, is that pre-enlistment screening to reduce attrition using the information the Army currently collects, with no concomitant modification to the existing applicant pool, would be highly counterproductive in a climate of difficult and costly recruiting.

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[6] An economic analysis appears in Appendix B.

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Appendix A.

Analyses with "High School Seniors" Excluded

Analyses with "High School Seniors" Excluded

Table A-1 shows summary statistics of the holdout group with the "High School Seniors" removed. It is the equivalent of Table 4 in the main body of text. With the "Seniors" removed, DEP Attrition of the remaining 72,209 contracts drops to 8.2%, 180-Day Attrition is unchanged from that shown in Table 4.

Table A-2 should be compared to Table A-1 to observe the impact of the screens with no "High School Seniors" in the sample. The trends are the same as in the main body of analyses: a little over ten thousand fewer contracts, about a one-point reduction in DEP Attrition, less than a point reduction in 180-Day Attrition, and the same roughly 1-1/2 point gain in the percentage of contracts resulting in soldiers Still Serving at 180 days.

The similarities with the main body of results are also evident in the reduction in the number of contracts that would have been required to achieve the unscreened number of soldiers completing 180 days of service. Table A-1 shows that 72,209 contracts resulted in 56,965 soldiers Still Serving at 180 days. Under the Maximum Screen without "Seniors," 70,676 contracts would have been required, a reduction of 1,533; under the augmented screen without "Seniors," 70,764 contracts would have resulted in the target 56,965 soldiers still serving, a reduction of 1,445 contracts. The order-of-magnitude reduction of 1,500 contracts is almost identical with or without the "High School Seniors."

The final analyses examined the quality of the screening decisions when the "High School Seniors" were excluded. Removing the "Seniors" does not change very much the picture seen in the main body of results, as Tables A-3 and A-4 show. Compared to the unscreened sample without "Seniors" (Table A-1), the rate of correct selection is slightly over 1-1/2 points higher, but the erroneous rejection rates are the highest of the four examined in the study (70.8% and 69.6%).

Table A-1

Holdout Sample With High School Seniors[a] Excluded

Sample Characteristic	Frequency	Percent
Contracts Signed	72,209	100.0
DEP Attrition	5,909	8.2
Random Losses	230	<1
Accessions to Active Duty	66,070	91.5
180-Day Attrition	9,105	13.8
Still Serving at 180 Days	56,965	78.9

[a] The total number of "High School Seniors" in the holdout sample was 7,598.

Table A-2

Holdout Sample Summary After Screening, High School Seniors Excluded

Sample Characteristic	Maximum Screen		Maximum Screen Augmented	
	Frequency	Percent	Frequency	Percent
Contracts Signed	59,552	100.0	61,475	100.0
DEP Attrition	4,197	7.0	4,336	7.1
Random Losses	197	<1	201	<1
Accessions to Active Duty	55,158	92.6	56,938	92.6
180-Day Attrition	7,149	13.0	7,440	13.1
Still Serving at 180 Days	48,009	80.6	49,498	80.5

Table A-3

Percentage of Individuals Selected and Rejected Under Maximum Screen, With High School Seniors Excluded

Status at 180 Days	Selected	Rejected
Still Serving	80.6	70.8
Attritted	19.4	29.2
Total	100.0	100.0

Table A-4

Percentage of Individuals Selected and Rejected Under Maximum Screen Augmented, With High School Seniors Excluded

Status at 180 Days	Selected	Rejected
Still Serving	80.5	69.6
Attritted	19.5	30.4
Total	100.0	100.0

Appendix B.

Economic Analysis

Economic Analysis

If recruiting costs $5,000 per soldier, and training/attrition costs $20,000 per soldier[1], the Army could theoretically turn away four applicants to preclude one training attrition. If the Army turns away more than four applicants the recruiting cost would exceed the cost of training/attrition, so that the screen would not be cost effective.

Maximum Screen turns away 13,620 applicants (4,386 correctly and 9,234 incorrectly) and contracts 66,187 applicants (50,318 correctly and 15,869 incorrectly) to obtain 50,318 training completions: 66,187/13,620 = 4.8.

Maximum Screen Augmented turns away 11,546 applicants (3,933 correctly and 7,613 incorrectly) and contracts 68,261 applicants (51,939 correctly and 16,322 incorrectly) to obtain 51,939 training completions: 68,261/11,546 = 5.9.

The attrition rate in the unscreened holdout sample was 25.4%. The attrition rate under Maximum Screen was 24% (15,869/66,187), under Maximum Screen Augmented it was 23.9% (16,322/68,187). For Maximum Screen's 1.4 point reduction in attrition to be cost effective, USAREC must contact and screen 2,927 more applicants (i.e., 66,187/4 = 16,547, and 16,547-13,620 = 2,927); for Maximum Screen Augmented's 1.5 point reduction to be cost effective the Command must contact and screen 5,519 more applicants (68,261/4 = 17,065, and 17,065-11,546 = 5,519).

This methodology generalizes such that **each one percentage point reduction in attrition** through use of **Maximum Screen** requires the contacting and screening of **an additional 2,091 applicants**; through **Maximum Screen Augmented, 3,679 additional applicants**.

[1] If these cost figures are not exact, analysts can substitute other costs and derive and apply the ratios of those costs.